NPN Silicon Darlington Transistors

T-33-29

BD 643
BD 645
BD 647
BD 649

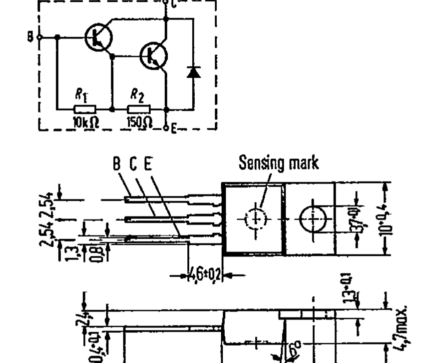
Epibase power darlington transistors (62.5W)

BD 643, BD 645, BD 647, and BD 649 are monolithic NPN silicon epibase power darlington transistors with diode and resistors in a TO 220 AB plastic package (TOP-66). The collectors of the two transistors are electrically connected to the metallic mounting area. These darlington transistors for AF applications are outstanding for particularly high current gain. Together with BD 644, BD 646, BD 648, and BD 650, they are particularly suitable for use as complementary AF push-pull output stages.

Type	Ordering code
BD 643	Q62702-D229
BD 643/BD 644	Q62702-D235
BD 645	Q62702-D231
BD 645/BD 646	Q62702-D236
BD 647	Q62702-D233
BD 647/BD 648	Q62702-D237
BD 649	Q62702-D374
BD 649/BD 650	Q62702-D376
Insulating nipple	Q62901-B55
Mica washer	Q62901-B52
Spring washer A 3 DIN 137	Q62902-B63



Change in dimensional drawings in preparation.



Approx. weight 18 g. Dimensions in mm

Maximum ratings		BD 643	BD 645	BD 647	BD 649	
Collector-emitter voltage	V_{CEO}	45	60	80	100	V
Collector-base voltage	V_{CBO}	45	60	80	100	V
Base-emitter voltage	V_{EBO}	5	5	5	5	V
Collector current	I_C	8	8	8	8	A
Collector-peak current (t < 10 ms)	I_{CM}	12	12	12	12	A
Base current	I_B	150	150	150	150	mA
Storage temperature range	T_{stg}	−55 to +150				°C
Junction temperature	T_j	150	150	150	150	°C
Total power dissipation ($T_{case} \leq 25$ °C, $V_{CE} \leq 10$ V)	P_{tot}	62,5	62,5	62,5	62,5	W
Thermal resistance						
Junction to ambient air	R_{thJA}	≤80	≤80	≤80	≤80	K/W
Junction to case[1]	R_{thJC}	≤2	≤2	≤2	≤2	K/W

1) For insulated mounting: If the mica washer Q62901-B 52 (50 to 90 μm) and the insulating nipple Q62901-B 55 are used this value increases by 4 K/W and with grease by 2 K/W.

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Static characteristics (T_{amb} = 25 °C)

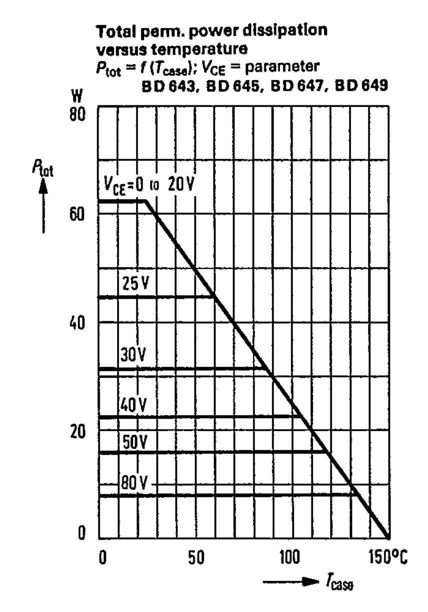
		BD 643	BD 645	BD 647	BD 649	
Collector cutoff current						
($V_{CB} = V_{CBmax}$)	I_{CBO}	<0.2	<0.2	<0.2	<0.2	mA
($V_{CB} = V_{CBmax}$; T_{amb} = 100 °C)	I_{CBO}	<2	<2	<2	<2	mA
Collector cutoff current ($V_{CE} = 0.5\ V_{CEmax}$)	I_{CEO}	<0.5	<0.5	<0.5	<0.5	mA
Emitter cutoff current (V_{EB} = 5 V)	I_{EBO}	<5	<5	<5	<5	mA
Collector-emitter breakdown voltage (I_C = 100 mA)[1]	$V_{(BR)CEO}$	>45	>60	<80	>100	V
Collector-base breakdown voltage (I_E = 5 mA)	$V_{(BR)CBO}$	>45	>60	>80	>100	V
Emitter-base breakdown voltage (I_E = 2 mA)	$V_{(BR)EBO}$	>5	>5	>5	>5	V
DC current gain						
(I_C = 0.5 A, V_{CE} = 3 V)	h_{FE}	1500	1500	1500	1500	–
(I_C = 3 A, V_{CE} = 3 V)	h_{FE}	>750	>750	>750	>750	–
(I_C = 6 A, V_{CE} = 3 V)	h_{FE}	750	750	750	750	–
Base-emitter forward voltage (I_C = 3 A, V_{CE} = 3 V)	V_{BE}	<2.5	<2.5	<2.5	<2.5	V
Collector-emitter saturation voltage (I_C = 3 A, I_B = 12 mA)	V_{CEsat}	<2	<2	<2	<2	V
Forward voltage of the protective diode at I_F = 3 A	V_F	1.8	1.8	1.8	1.8	V

Dynamic characteristics (T_{amb} = 25 °C)

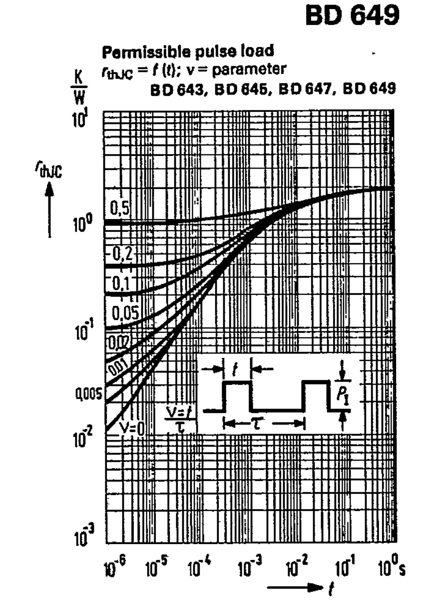
Transition frequency (I_C = 3 A, V_{CE} = 3 V, f = 1 MHz)	f_T	7 (>1)	7 (>1)	7 (>1)	7 (>1)	MHz
Cutoff frequency in common emitter configuration (I_C = 3 A; V_{CE} = 3 V)	f_{hfe}	60	60	60	60	kHz

1) t = 200 µs, duty cycle 1%.

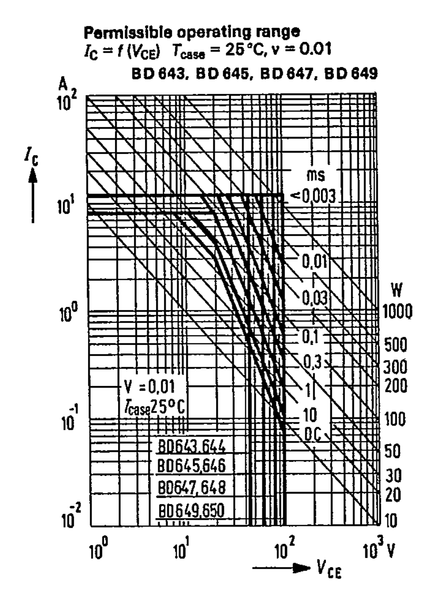
Total perm. power dissipation versus temperature
$P_{tot} = f(T_{case})$; V_{CE} = parameter
BD 643, BD 645, BD 647, BD 649



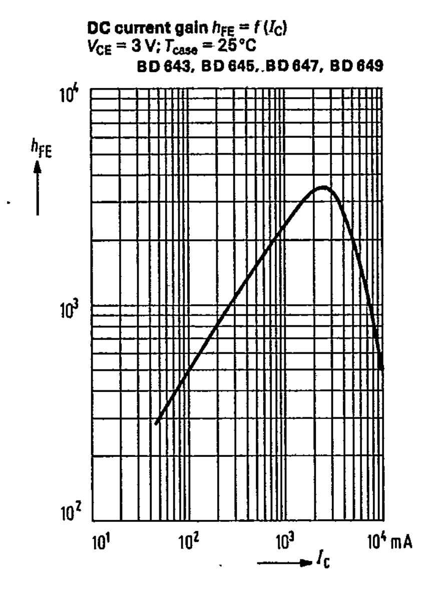
Permissible pulse load
$r_{thJC} = f(t)$; v = parameter
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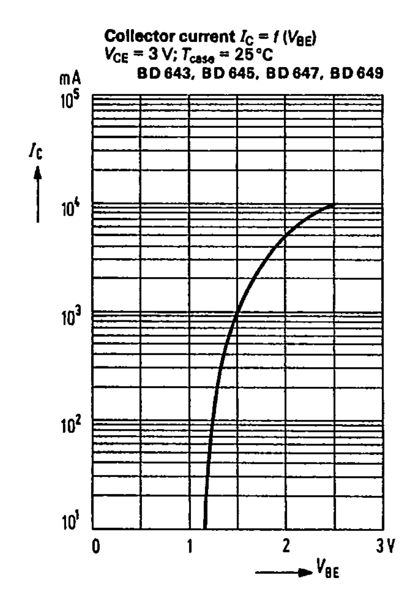
Permissible operating range
$I_C = f(V_{CE})$ $T_{case} = 25°C$, v = 0.01
BD 643, BD 645, BD 647, BD 649



DC current gain $h_{FE} = f(I_C)$
V_{CE} = 3 V; T_{case} = 25°C
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Collector current $I_C = f(V_{BE})$
$V_{CE} = 3$ V; $T_{case} = 25$ °C
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Collector-emitter saturation voltage
$V_{CEsat} = f(I_C)$; $h_{FE} = 250$; $T_{case} = 25$ °C
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